

What is claimed is:

1. A control system comprising:
a plurality of peripheral devices represented as objects; and
a controller connectable to said plurality of peripheral devices via a common communication line for unitarily controlling said plurality of peripheral devices, said controller being arranged to be connected to an arbitrary number of peripheral devices selected from among said plurality of peripheral devices, read control information stored in the arbitrary number of peripheral devices via the communication line into a predetermined memory area of said controller in a predetermined format so that said controller can control said arbitrary number of peripheral devices,
said controller being also arranged to issue a command and transmit the command to each of the arbitrary number of peripheral devices via the communication line.

2. A control system according to claim 1, wherein said plurality of peripheral devices represented as the objects and said controller each include message communicating means for communicating a message indicative of a control instruction, a data input/output instruction or the like between each of said plurality of peripheral devices and said controller.

3. A control system according to claim 2, wherein said plurality of peripheral devices represented as the objects and said controller each include methods containing execution procedures, functions, subroutines and the like each of which is to be specified by the message, as well as an environment for executing each of the methods.

4. A control system according to claim 3, wherein said plurality of peripheral devices represented as the objects and said controller are each encapsulated in such a manner as to hide internal data indicative of an internal state, a variable parameter and the like in its inside and also to call a method to indirectly access the internal data.

5. A control system according to claim 4, wherein each of said plurality of peripheral devices represented as the objects holds a manipulation panel, a display device and the like as a graphical user interface (GUI) in such a manner as to be able to be manipulated or provide display by means of said controller located externally of each of said plurality of peripheral devices, each of said plurality of peripheral devices including means for sending out the graphical user interface to said controller.

6. A control system according to claim 5, wherein each of said plurality of peripheral devices represented as the objects includes a method definition table which defines a method corresponding to an operation of the manipulation

panel held as the graphical user interface (GUI), and means for sending out the method definition table to said controller.

7. A control system according to claim 6, wherein each of said plurality of peripheral devices represented as the objects realizes both the graphical user interface (GUI) and the method definition table as a GUI object, each of said plurality of peripheral devices including means for sending out the GUI object to said controller.

8. A control system according to claim 6, wherein each of said plurality of peripheral devices represented as the objects realizes both the graphical user interface (GUI) and the method definition table as a GUI description language, each of said plurality of peripheral devices including means for sending out the GUI description language to said controller.

9. A control system according to claim 1, wherein said controller includes display means for displaying a state of physical connection of each of said plurality of peripheral devices represented as the objects.

10. A control system according to claim 1, wherein said controller includes display means for displaying a state of operation of each of said plurality of peripheral devices represented as the objects, and varying means for varying the

state of operation of each of said plurality of peripheral devices represented as the objects.

11. A control system according to claim 1, wherein said controller includes reading means for reading, from each of said plurality of peripheral devices represented as the objects, a graphical user interface and a method definition table for controlling each of said plurality of peripheral devices, and display means for displaying the graphical user interface and the method definition table.

12. A control system according to claim 11, wherein said controller includes a function for realizing, by using a GUI object, processing for reading, from each of said plurality of peripheral devices represented as the objects, the graphical user interface and the method definition table for controlling each of said plurality of peripheral devices.

13. A control system according to claim 11, wherein said controller includes a function for realizing, by using a GUI description language, processing for reading, from each of said plurality of peripheral devices represented as the objects, the graphical user interface and the method definition table for controlling each of said plurality of peripheral devices.

14. A control system according to claim 11, wherein said controller includes means for retrieving from the method

definition table a method corresponding to a manipulation of a button or the like of the graphical user interface for controlling each of said plurality of peripheral devices represented as the objects, and means for sending the retrieved method as a message to a desired one of said plurality of peripheral devices represented as the objects.

15. A control system according to claim 1, wherein said controller includes a function for downloading a program and data from an external peripheral device for the purpose of functionally modifying said controller itself, such as enhancing the function thereof or fixing a bug.

16. A system control apparatus comprising:
a plurality of peripheral devices represented as objects; and

a controller for unitarily controlling said plurality of peripheral devices via a common communication line,

said controller and said plurality of peripheral devices each including a bi-directional interface for bi-directionally communicating data over the communication line,

object data about control of a function of each of said plurality of peripheral devices being stored in a respective one of said plurality of peripheral devices in advance,

said controller loading, when connected to an arbitrary peripheral device selected from among said

plurality of peripheral devices, the object data from the arbitrary peripheral device to form an object corresponding to the arbitrary peripheral device and also to display under control of said controller a manipulation picture for manipulating the arbitrary peripheral device on the basis of the object data,

said controller outputting an instruction to the communication line via the object in accordance with a manipulation based on the manipulation picture displayed on said controller, and controlling the arbitrary peripheral device.

17. A system control apparatus according to claim 16, wherein said plurality of peripheral devices represented as the objects and said controller each include message communicating means for communicating a message indicative of a control instruction, a data input/output instruction or the like between each of said plurality of peripheral devices and said controller.

18. A system control apparatus according to claim 16, wherein said plurality of peripheral devices represented as the objects and said controller each include a group of methods containing execution procedures, functions, subroutines and the like each of which is to be specified by the message, as well as an environment for executing each of the methods.

19. A system control apparatus according to claim 16, wherein said plurality of peripheral devices represented as the objects and said controller are each encapsulated in such a manner as to hide internal data indicative of an internal state, a variable parameter and the like in its inside and also to call a method to indirectly access the internal data.

20. A system control apparatus according to claim 16, wherein each of said plurality of peripheral devices represented as the objects holds a manipulation panel, a display device and the like as a graphical user interface (GUI) in such a manner as to be able to be manipulated or provide display by means of said controller located externally of each of said plurality of peripheral devices, each of said plurality of peripheral devices including means for sending out the graphical user interface to said controller.

21. A system control apparatus according to claim 20, wherein each of said plurality of peripheral devices represented as the objects includes a method definition table which defines a method corresponding to an operation of the manipulation panel held as the graphical user interface (GUI), and means for sending out the method definition table to said controller.

22. A system control apparatus according to claim 21, wherein each of said plurality of peripheral devices

represented as the objects realizes both the graphical user interface (GUI) and the method definition table as a GUI object, each of said plurality of peripheral devices including means for sending out the GUI object to said controller.

23. A system control apparatus according to claim 21, wherein each of said plurality of peripheral devices represented as the objects realizes both the graphical user interface (GUI) and the method definition table as a predetermined description language, each of said plurality of peripheral devices including means for sending out the predetermined description language to said controller.

24. A system control apparatus according to claim 16, wherein said controller includes display means for displaying a state of physical connection of each of said plurality of peripheral devices represented as the objects.

25. A system control apparatus according to claim 16, wherein said controller includes display means for displaying a state of operation of each of said plurality of peripheral devices represented as the objects, and varying means for varying the state of operation of each of said plurality of peripheral devices represented as the objects.

26. A control system comprising:
a plurality of multimedia devices; and

a control device for controlling said plurality of multimedia devices,

said plurality of multimedia devices and said control device being connected to a network in such a manner that said plurality of multimedia devices and said control device can communicate a message and data based on an object-oriented technique between each of said plurality of multimedia devices and said control device via the network,

said control device including display means for displaying icons representative of said respective plurality of multimedia devices, and pointing means for forming a link between arbitrary multimedia devices selected from among said plurality of multimedia devices to specify a data input and output relationship between the arbitrary multimedia devices.

27. A control system according to claim 26, further comprising a user interface for displaying the link and the icons representative of said respective plurality of multimedia devices connected to the network, and display means for displaying said user interface.

28. A system control apparatus comprising:
a plurality of multimedia devices; and
a control device for controlling said plurality of multimedia devices,

said plurality of multimedia devices and said control device being connected to a network in such a manner that said plurality of multimedia devices and said control

device can communicate a message and data based on an object-oriented technique between each of said plurality of multimedia devices and said control device via the network,

said control device for controlling said plurality of peripheral devices including data input and output relationship specifying means and data format acceptability determining means, the data format acceptability determining means being arranged to determine, when a data input and output relationship is specified between arbitrary multimedia devices selected from among said plurality of multimedia devices, whether there is a data format acceptable to the selected, arbitrary multimedia devices.

29. A system control apparatus according to claim 28, further comprising means for issuing, if the data format acceptability determining means determines that there is no data format acceptable to the selected, arbitrary multimedia devices, a message indicating that data communication is impossible because there is no data format acceptable to the selected, arbitrary multimedia devices.

30. A multimedia device which constitutes part of a system including a plurality of multimedia devices and a control device for controlling said plurality of multimedia devices, the plurality of multimedia devices and the control device being connected to a network in such a manner that the plurality of multimedia devices and the control device can communicate a message and data based on an object-oriented

technique between each of the plurality of multimedia devices and the control device via the network, said multimedia device comprising:

answer means for answering an inquiry about a file format which can be inputted or outputted, the inquiry being transmitted from the control device; and

means for informing, if a plurality of data formats can be inputted or outputted, the control device of an order of priorities of the plurality of data formats.

31. A system control apparatus for controlling a plurality of multimedia devices in a system which includes the plurality of multimedia devices and a control device for controlling the plurality of multimedia devices, the plurality of multimedia devices and the control device being connected to a network in such a manner that the plurality of multimedia devices and the control device can communicate a message and data based on an object-oriented technique between each of the plurality of multimedia devices and the control device via the network, said system control apparatus comprising:

means for introducing data in which a class based on an object-oriented technique is described, from an external part; and

means for generating an object from the class based on the object-oriented technique.

32. A data recording apparatus suitable for use in a

system in which a plurality of devices can communicate data to each other via a network, comprising:

storage means for temporarily storing information contained in a header part of time-series data if the time-series data is transmitted in real time when a data recording mode is not active; and

recording means for reading, if the data recording mode becomes active, the header part from said storage means, locating the header part at a leading end of the time-series data and recording the header part as well as the time-series data on a recording medium.

33. A control apparatus suitable for use in a system in which a plurality of devices can communicate data to each other via a network, comprising:

decision means for determining whether a program data has been received via the network; and

activating means for automatically activating a program based on the program data if said decision means determines that the program data has been received.

34. A multimedia control system comprising:

multimedia devices; and

a multimedia controller for unitarily managing said multimedia devices,

said multimedia devices and said multimedia controller being connected to each other via a communication line,

said multimedia devices each including a first interface control unit which functions to supervise communication with said multimedia controller,

the first interface control unit including an interface controller for controlling communication at a physical or logical low level and a first system controller for executing communication with a device function unit of each of said multimedia devices and control of the interface control unit,

said multimedia controller including a second interface control unit for controlling communication with each of said multimedia devices,

the second interface control unit including:

an interface controller for controlling communication at a physical or logical low level;

device connection/disconnection signal processing means for processing a device connection signal indicative of a connection of any of said multimedia devices which connection is detected by the interface controller or a device disconnection signal indicative of a disconnection of any of said multimedia devices which disconnection is detected by the interface controller;

storage means for storing a device connection management table which is to be referred to and updated in the device connection/disconnection signal processing means; and

a second system controller for executing communication with a controller function unit of said

multimedia controller and the second interface control unit.

35. A multimedia control system according to claim 34, wherein said multimedia controller includes a first timer circuit which starts its operation in synchronism with a power-on operation of said multimedia controller, connection confirmation message sending means for sending a connection confirmation message to each of said multimedia devices at regular intervals in accordance with an output of the first timer circuit, and means for updating the device connection management table on the basis of state information about said multimedia devices which is obtained from the device connection signal transmitted by each of said multimedia devices in response to the connection confirmation message signal.

36. A multimedia control system according to claim 35, wherein said multimedia controller further includes message re-sending means for re-sending the connection confirmation message to a multimedia device which, while said multimedia control system is confirming a connection status about said multimedia control system through the connection confirmation message sending means, does not retransmit any of the device connection signals corresponding to individual multimedia devices registered on the device connection management table, and means for erasing an area corresponding to the multimedia device from the device connection management table if no acknowledgment of the connection confirmation message re-sent

from the message re-sending means is retransmitted from the multimedia device.

37. A multimedia control system according to claim 34, wherein each of said multimedia devices includes a second timer circuit which starts its operation in synchronism with a power-on operation of a respective one of said multimedia devices, and means for sending the device connection signal to said multimedia controller at regular intervals in accordance with an output of the second timer circuit, said multimedia controller includes means for updating the device connection management table on the basis of state information about said multimedia devices which is obtained from the device connection signal.

38. A multimedia control system according to claim 37, wherein said multimedia controller includes:

means arranged to set, on the device connection management table, counters corresponding to said respective multimedia devices on a one-to-one basis if said multimedia controller, while confirming a connection status about said multimedia control system on the basis of the device connection signals retransmitted from said respective multimedia devices, determines that a particular one of the device connection signals retransmitted from said respective multimedia devices to said multimedia controller is a signal retransmitted from a multimedia device which is not yet registered on the device connection management table, and

arranged to reset the counters which are already set on the device connection management table and correspond to said respective multimedia devices on a one-to-one basis, if said multimedia controller, while confirming the connection status about said multimedia control system on the basis of the device connection signals retransmitted from said respective multimedia devices, determines that the particular device connection signal is a signal retransmitted from a multimedia device which is already registered on the device connection management table;

means for independently incrementing the respective counters in synchronism with the output of the first timer circuit;

message re-sending means for re-sending the connection confirmation message at least once from said multimedia controller to each of said multimedia devices if the value of a respective one of the counters exceeds a predetermined threshold; and

means for erasing an area corresponding to a particular multimedia device from the device connection management table if no acknowledgment of the connection confirmation message re-sent from the message re-sending means is retransmitted from the particular multimedia device.

39. A multimedia control system according to claim 34, wherein each of said multimedia devices includes at least two network line connection terminals, line connection detecting circuits corresponding to the respective network line

connection terminals on a one-to-one basis, and means for transmitting the device connection signal or the device disconnection signal to said multimedia controller if the means detects a variation in a state of connection or disconnection of an arbitrary one of said multimedia devices which variation is an output from the arbitrary one,

if a second multimedia device is connected to a first multimedia device from among said multimedia devices, the first multimedia device transmitting the device connection signal to said multimedia controller in accordance with an output of the line connection detecting circuit of the first multimedia device which corresponds to the network line connection terminal to which the second multimedia device is connected,

if the second multimedia device is disconnected from the first multimedia device, the first multimedia device transmitting the device disconnection signal to said multimedia controller in accordance with an output of the line connection detecting circuit of the first multimedia device which corresponds to the network line connection terminal from which the second multimedia device is disconnected,

said multimedia controller including means for receiving the device connection signal or the device disconnection signal and updating the device connection management table in the device connection/disconnection signal processing means.

40. A multimedia control system according to claim 39, wherein said multimedia controller includes message re-sending means for re-sending, when said multimedia controller receives the device disconnection signal, the connection confirmation message to a multimedia device which has transmitted the device disconnection signal, and means for erasing an area corresponding to the multimedia device from the device connection management table if no acknowledgment of the connection confirmation message re-sent from the message re-sending means is retransmitted from the multimedia device.

41. A multimedia control system according to claim 34, wherein a relay is provided between said multimedia controller and each of said multimedia devices, said relay including network line connection terminals for connection to said respective multimedia devices, line connection detecting circuits corresponding to the respective network line connection terminals on a one-to-one basis, means for transmitting the device connection signal or the device disconnection signal to said multimedia controller in accordance with an output of any of said line connection detecting circuits, an interface controller for controlling communication at a physical or logical low level, and control means for controlling all constituent elements of the relay, said multimedia controller including means for receiving the device disconnection signal or the device connection signal and updating the device connection management table.

42. A multimedia control system according to claim 41, wherein said means for receiving the device disconnection signal or the device connection signal and updating the device connection management table in said multimedia controller includes message re-sending means for re-sending the connection confirmation message to a multimedia device which has transmitted the device disconnection signal or the device connection signal, and means for erasing an area corresponding to the multimedia device from the device connection management table if no acknowledgment of the connection confirmation message re-sent from the message re-sending means is retransmitted from the multimedia device.

43. A multimedia control system according to claim 35 or 36, wherein each of said multimedia devices includes network line connection terminals, line connection detecting circuits corresponding to the respective network line connection terminals, and means for transmitting the device connection signal or the device disconnection signal to said multimedia controller when detecting a variation in a state of connection or disconnection of an arbitrary one of said multimedia devices which variation is an output from each of said line connection detecting circuits, said multimedia controller including means for receiving the device connection signal or the device disconnection signal and updating the device connection management table in said device connection/disconnection signal processing means.

44. A multimedia control system according to claim 43, wherein said multimedia devices, said multimedia controller and said relay respectively include line connection connector parts each having a switch to be turned on when a line cable is inserted thereinto, a mechanism for locking the line cable, and a manipulating member arranged to be capable of simultaneously releasing the locked line cable and turning off the switch, each of the line connection connector parts being arranged to transmit an output signal of the switch to a respective one of said line connection detecting circuits.

45. A multimedia control system according to claim 44, wherein said multimedia devices and said multimedia controller each include a first power source circuit for supplying electrical power to both of the first and second interface control units, and a second power source circuit for executing a power-on/off operation in accordance with a manipulation by a user of a main switch of a corresponding one of said multimedia devices and said multimedia controller or in accordance with a message sent from said multimedia controller.

46. A multimedia control system according to claim 45, wherein said multimedia controller includes means for assigning said respective multimedia devices unique identification names corresponding to said respective multimedia devices on a one-to-one basis at a time when said multimedia controller recognizes said multimedia devices

connected to said multimedia control system by receiving the device connection signal or the device disconnection signal and updating the device connection management table, and means for informing the assigned identification names of the respective multimedia devices, each of said multimedia devices including a display device for displaying a respective one of the informed identification names.

add
B2
add
C7
add
E1